

APPLICATION UNDER UNITED STATES PATENT LAWS

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Invention: TOOL CONTAINER

Inventor (s): ITZKOVITCH, Guy

Pillsbury Winthrop LLP
Intellectual Property Group
1600 Tysons Boulevard
McLean, VA 22102
Attorneys
Telephone: (703) 905-2000

This is a:

- ☐ Provisional Application
- ☒ Regular Utility Application
- ☐ Continuing Application
☒ The contents of the parent are incorporated by reference
- ☐ PCT National Phase Application
- ☐ Design Application
- ☐ Reissue Application
- ☐ Plant Application
- ☐ Substitute Specification
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SPECIFICATION

TOOL CONTAINER

[0001] The present application claims priority to U.S. Provisional Patent Appln. Serial No. 60/268,924, the entirety of which is hereby incorporated into the present application by reference.

Field of the Invention

[0002] The invention relates generally to tool containers.

Background of the Invention

[0003] Small hand tools such as hammers, screwdrivers and the like are often stored and carried in a tool container. A tool container is a small box-like assembly that has a storage space that is covered by a cover portion. Tool containers are constructed to be small enough to be easily lifted and carried by one person using one hand. Typically the tools are stored in the storage space by placing them generally on top of one another in an unorganized pile. This arrangement of the tools is simple and convenient for most purposes, but may be undesirable when storing a relatively sensitive and easily damaged measuring instrument such as a level.

[0004] A typical level includes a precisely constructed (i.e., highly dimensionally accurate) elongated frame or body that includes a measuring surface and a plurality of bubble vials mounted in the body. The bubble vials are typically fluid filled tubes that are constructed of, for example, glass or plastic or other materials that can be damaged and are enclosed within protective transparent windows or covers that are also made of material that may be scratched or damaged. Storing a level as part of a pile of tools in a storage compartment of the tool container with other hand tools provides for a relatively sloppy storage arrangement, may damage the level, and may make access to the level difficult.

Summary of the Invention

[0005] The present invention provides a tool container comprising a case portion defining a storage space and a cover portion movably attached to the case portion and being pivotally moveable between a closed position in which the

cover portion covers an upwardly facing opening of the storage space and an open position in which access to the storage space through the upwardly facing opening is permitted. The cover portion is securable in its closed position. The cover portion has an elongated level storage space for storing a level therein. A secondary cover portion is movably mounted with respect to the cover portion for movement between a closed position wherein the secondary cover portion covers the elongated level storage space to retain the level therein and an open position wherein access to the level stored in the elongated storage space is permitted. A handle is connected to the cover portion to facilitate transport of the tool container.

[0006] The present invention also relates to a combination level and tool container.

[0007] Other aspects, features and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

Brief Description of the Drawings

[0008] The present invention is further described in the detailed description which follows, by reference to the noted drawings by way of non-limiting illustrative embodiments, in which like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

[0009] FIG. 1 is a perspective view of an embodiment of a tool container of the invention;

[0010] FIG. 1A is a perspective view of an embodiment of a tool container of the invention;

[0011] FIG. 2 is a perspective view of the tool container of FIG. 1 showing a second cover portion in the open position to expose a level and showing a tool box tray;

[0012] FIG. 3 is another perspective view of the tool container with a cover portion in the open position;

[0013] FIG. 3A is a top view of the tool container;

[0014] FIG. 4 is a front view of the tool container;

[0015] FIG. 5 is a bottom view of the tool container;

[00016] FIG. 6 is a back view of the tool container;

[00017] FIGS. 7A and 7B show views of opposite sides of the tool container;

[00018] FIGS. 8A and 8B are cross-sectional views showing embodiments of the second cover portion that include examples of securing mechanisms for holding a level;

[00019] FIG. 9 is a cross-sectional view of the second cover portion without a securing mechanism; and

[00020] FIG. 10 is a perspective view of the second cover portion in isolation showing a hinge mechanism.

Detailed Description of the Invention

[00021] While the present invention will hereinafter be described in connection with at least one example embodiment thereof, it should be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

[00022] Referring now more particularly to the drawings, FIG. 1 illustrates a tool container according to an embodiment of the present invention. The tool container, generally indicated by reference numeral 10, may be used for storing and accessing items, such as work tools, e.g., hammers, drills, screw drivers, wrenches, etc., and work accessories, e.g., nails, drilling accessories, screws, nuts, bolts, etc. In the embodiment shown in FIG. 1, the tool container 10 generally includes a case 14, which defines a storage space 18, and a cover portion 22. The cover portion 22 may be pivotally attached to the case 14 by a hinge mechanism 26 along an upper edge of the case 14 at a first pivot axis 30. The cover portion 22 may be pivotally moveable about the first pivot axis 22 between a closed position in which the cover portion 22 covers an upwardly facing opening 34 into an upper region 38 of the storage space 18 and an open position in which access to the upper region 19 through the upwardly facing opening 34 is permitted, the cover portion 22 being securable in the closed position. The case 14 includes a front wall 124, back

wall 120, two side walls 132, and a bottom wall 133 to generally define storage space 18.

[00023] The cover portion 22 includes a second cover portion 38, generally indicated at 38, that is pivotally mounted thereto about a second pivot axis 42. The second cover portion 38 may extend longitudinally of the cover portion 22. The second cover portion 38 covers a second storage compartment or area formed by a recess 64 in the cover portion 22, which is adapted to store a level 39 therein as can be understood from FIG. 2. The level 39 includes a measuring surface 41 and one or more bubble vials 43 for indicating whether or not a surface is level or plumb. An example of a level that may be used in combination with the tool container 10 is disclosed and described in U.S Patent Application Serial No. 09/604,792 filed June 28, 2000, which application is hereby incorporated by reference in its entirety into the present application. The second storage area 64 is preferably elongated to accommodate the elongated level 39, as can be understood from the figures. Levels are commercially available in several lengths, such as twenty four inches, for example. A tool container suitable for storing a twenty four inch level may be approximately 26 inches in length. The second cover portion 38 may also be configured to have the level 39 carried therein or removably attached thereto, as described below. The second cover portion 38 is pivotally moveable about the second pivot axis 42 between a closed condition with respect to the cover portion 22 wherein the top portion 46 of the second cover portion 38 is flush with the cover portion 22 (FIG. 1) and an open condition with respect to cover portion 22, wherein the level stored therein is accessible. The second pivot axis 42 is preferably substantially parallel to the first pivot axis 30.

[00024] The second cover portion 38 may include, on an inner portion thereof, level mounting structure in the form of a securing mechanism to removably secure the level 39 to the underside of the top portion 46 of the second cover portion 38. For example, the securing mechanism may include a lip or lower wall portion 50 (see FIG. 8A) spaced apart from another wall portion defining the top portion 46 by a connecting wall portion 54, such that the second cover portion 38 has a U-channel cross-sectional shape which forms a partially enclosed space in which the

level 39 can be placed. The cover portion 38 may be constructed so that the level 39 is held within the U-shaped channel by an interference fit. The level is shown mounted or "nested" within the U-channel for storage therein in FIG. 8A. Alternatively, the securing mechanism may include resiliently biased holding structures or clips 58 (see FIG. 8B) that may each extend through an opening 61 in the body portion of the level 39 to engage a locking edge or surface 62 on each holding structure 58 with a surface on the level 39, to thereby removably attach or secure the level 39 to the underside of the second cover portion 38. With the above securing mechanisms, the level is attached to the second cover portion 38. When the second cover portion 38 is closed (i.e., the top portion 46 is level with the cover portion 22), the level is stored within the storage compartment 64 formed in the cover portion 22.

[00025] Additionally, the level may simply be disposed within a recess or pocket-like storage compartment 64 formed within the cover portion 22, as shown in FIG. 9 without being mounted on or otherwise interengaged with the secondary cover portion 38. Here, the level 39 is simply placed in the recess 64 without being secured thereto or to the underside of the second cover portion 38. The recess 64 may be integrally formed with the cover portion. The recess 64 protects the level 39 from contact, and thus possible damage, with other tools that may be contained within the tool box 10. The recess 64 may also present where the level is attached to the second cover portion 38 via the securing mechanisms described above, to thus protect the level 39 from contact with other tools. In those embodiments in which the level 39 is mounted on (i.e., not removably connected to or positioned within a compartment or storage space of) the second cover portion 38, a worker removes the level 39 by opening the second cover portion 38 and lifting the level 39 out of the recess 64. That is, when the second cover portion 38 is opened, the level remains in the recess 64. In those embodiments in which the level 39 is mounted on or carried by the second cover portion 38 (by being removably attached thereto or by being partially enclosed within a storage space formed therein, for example), the movement of the second cover portion 38 from its closed position to its open position lifts the level 39 out of the recess or storage compartment 64. This

has several advantages including, for example, assisting the worker in removing the level from the compartment and positioning the level so that it can be grasped easily. This arrangement also makes it easier for the worker to place the level 39 back in its storage position in the storage compartment 64. The weight of the level also tends to move the second cover portion 38 in its closing direction to its closed position and the weight of the level helps keep the second cover portion 38 in its closed position. Removably attaching the level to the second cover portion 38 also affirmatively mounts the level to the second cover portion 38 in the recess which prevent the level from rattling or moving around in the recess when the tool container is being carried.

[00026] If the level is simply stored with the recess 64, the second cover portion 38 is essentially a pivotable cover that pivots about the second pivot axis 42, which, when in the open position, allows access to a storage space defined by recess 64.

[00027] The tool container 10 may also include a removable tray 68 configured to store items therein. The tray 68 includes an integrally formed handle 72. When contained within the tool container 10, the tray 68 is disposed within the case 14 and rests on ledges or protrusions 76 which form support surfaces that are integrally formed in the walls of the case 14. Alternatively, the tray 68 may engage ledges 80 that are integrally formed within the walls of the case 14, the ledges 80 being a top portion of recess channels 84 formed in the four walls of the case 14. When the tray 68 is stored inside the tool container 10, the tray 68 generally divides the storage space 18 into an upper region 84, which is defined by the space confined by the cover portion 22 and tray 68, and a lower region 88, which is defined by the space confined by the tray 68 and the four walls and bottom wall of the case 14.

[00028] The second cover portion 38 includes the hinge mechanism 92 which permits the second cover portion 38 to pivot with respect to the cover portion 22, about the second pivot axis 42. As shown in greater detail in FIG. 10, the hinge mechanism 92 may include protruding portions 96 that engage corresponding female portions 100 (or holes) formed in the cover portion 22 (see FIG. 1). The protruding portions 96 may be integrally formed with the second cover portion 38, or they may be metal pins fixedly attached thereto.

[00029] As noted above, the case 14 includes the hinge mechanism 26 connected to the cover portion 22 that permits the cover portion to pivot with respect thereto, about the first pivot axis 30. As shown in greater detail in FIG. 4, the hinge structure 26 may include a plurality of cylindrical shaft members 104 supported in a series of aligned journaling members 108. The series of aligned journaling members 108 may extend from a rear surface 112 of the case 14 and from a bottom, rear edge 116 of the cover portion 22. Thus, the cylindrical shaft members 104 and the series of aligned journaling members 108 form the first pivot axis 30. The shaft member and the series of aligned journaling members 108 are positioned relative to the bottom, rear edge 120 of the cover portion 22 so as to allow the cover portion 116 to pivot about the pivot axis 30 without obstruction. The hinge structure 26 may include other types of hinge mechanisms, as generally known in the art.

[00030] The front, rear and side walls 124, 128, 132 of the case 14 define an upper peripheral surface 136, which is configured to mate with a bottom peripheral surface 140 of the cover portion 22 so as to support the cover portion 22 thereon when the cover portion 22 is in the closed position.

[00031] In general, the cover portion 22, case 14, and tray 68 may be made from plastic or any other suitable material such as metal, wood, or other material. Regardless of the material selected, each component 22, 14, 68 is preferably an integrally formed structure.

[00032] The cover portion 22 includes an upper exterior surface 140 that defines a handle receiving space 168 disposed centrally of the cover portion 22. Disposed within receiving space 168 is a handle 170 connected to the cover portion 22 which may be used to facilitate transport of the tool container. Also, the handle 170 may also include one or two handles (not shown) attached to the case 14. The handle 170 may be pivotally attached to the cover portion 22, or, alternatively, rigidly connected. The handle 170 may be substantially U-shaped with its open end facing toward the cover portion 22. The handle 170 may include a gripping portion 172 and a pair of leg portions 173 integrally extending therefrom and pivotally attached to the cover portion 22.

[00033] The exterior surface 166 may include a number of projections 174 that extend upwardly from the cover portion 22. The projections 174 may be arranged in any configuration to enhance aesthetic appeal or to provide a work surface for the tool container 10.

[00034] The cover portion 116 may be secured in a closed position with at least one releasable locking mechanism, generally indicated by reference numeral 181. In the illustrated embodiment, two locking mechanisms 181 are mounted within recessed portions 177 that are laterally spaced apart on a peripheral portion of the cover portion 116.

[00035] The second cover portion 38 includes an extended portion 200 that, when the second cover portion 38 is in the closed position extends along the front side of the cover portion to a tab 204 formed at the peripheral surface 136 of the case 14, positioned intermediately of wall 124. This tab 204 has a hole 208 formed therethrough that is adapted to align with a hole 212 in the extended portion 200 of the second cover portion 38. A user may use these holes 208, 212 to lock the storage compartment using a combination lock or a key operated lock. When locked, the cover portion is also locked. Alternatively, the tab 204 may be formed on the cover portion (see FIG. 1A) so that only the second cover portion 38 locks (not shown) when utilized. In such a case, the locking mechanisms 181 preferably include a ring portion configured to accommodate a combination or key lock. A tab may also be formed on both the cover portion 22 and the case 14, as shown in FIG. 1. The second cover portion may also include protruding portions 201 for a user to engage to lift second cover portion 38. These protruding portions 201 are curved downward so that the top of the cover portion 22 maintains a generally flat surface when the second cover portion 38 is in the closed position.

[00036] The present invention is not intended to be limited to the storage of a level, and the level is not required to be a part of the present invention.

[00037] Thus, while the invention has been described with reference to the certain illustrated embodiments, the words which have been used herein are words of description, rather than words of limitation. Changes may be made, within the purview of the appended claims, without departing from the scope and spirit of

the invention in its aspects. Although the invention has been described herein with reference to particular structures, acts, and materials, the invention is not to be limited to the particulars disclosed, but rather extends to all equivalent structures, acts, and materials, such as are within the scope of the appended claims.

1. A method of determining a value of a function of a variable, the method comprising:
2. receiving a value of the variable;
3. determining a value of the function of the variable based on the value of the variable;
4. outputting the value of the function of the variable.
5. A system for determining a value of a function of a variable, the system comprising:
6. a processor;
7. a memory; and
8. a program stored in the memory and executable by the processor, the program comprising:
9. a first instruction to receive a value of the variable;
10. a second instruction to determine a value of the function of the variable based on the value of the variable;
11. a third instruction to output the value of the function of the variable.